

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

As rescanning documents *will not* correct images,  
please do not report the images to the  
**Image Problem Mailbox.**

# (12) UK Patent Application (19) GB (11) 2 290 224 (13) A

(43) Date of Publication 20.12.1995

(21) Application No 9409398.6

(22) Date of Filing 11.05.1994

(71) Applicant(s)  
Chi Hung Chan  
Flat E 2nd Floor, Yau Hong Court, Lei King Wan,  
Hong Kong

(72) Inventor(s)  
Chi Hung Chan

(74) Agent and/or Address for Service  
Lloyd Wise, Tregear & Co  
Norman House, 105-109 Strand, LONDON, WC2R 0AE,  
United Kingdom

(51) INT CL<sup>6</sup>  
A61C 17/26, A46B 7/08

(52) UK CL (Edition N)  
A4K KBC  
U1S S1125

(56) Documents Cited  
EP 0537465 A2 EP 0046521 A1 WO 90/09123 A  
US 5170525 A US 5138734 A US 5070567 A

(58) Field of Search  
UK CL (Edition M) A4K KBC  
INT CL<sup>6</sup> A46B 7/06 7/08 7/10, A61C 17/22 17/24  
17/26

## (54) Power driven toothbrush

(57) The brush member of a toothbrush comprises at least two heads (210, 220) each having a plurality of bristle tufts (230). Gear means for setting the heads in rotation (continuous and contra-rotatory) comprise a driving gear (170) which meshes with a first gear (180) corresponding to first head (210) which gear (180) in turn meshes with a second gear (190) of the second head (220).

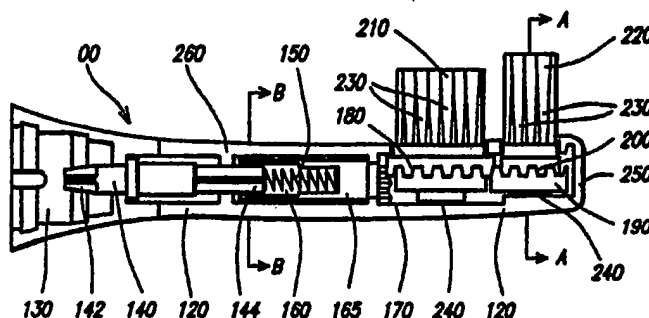


FIG. 1.

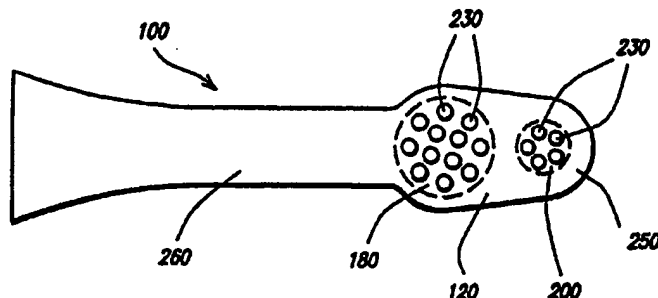


FIG. 2.

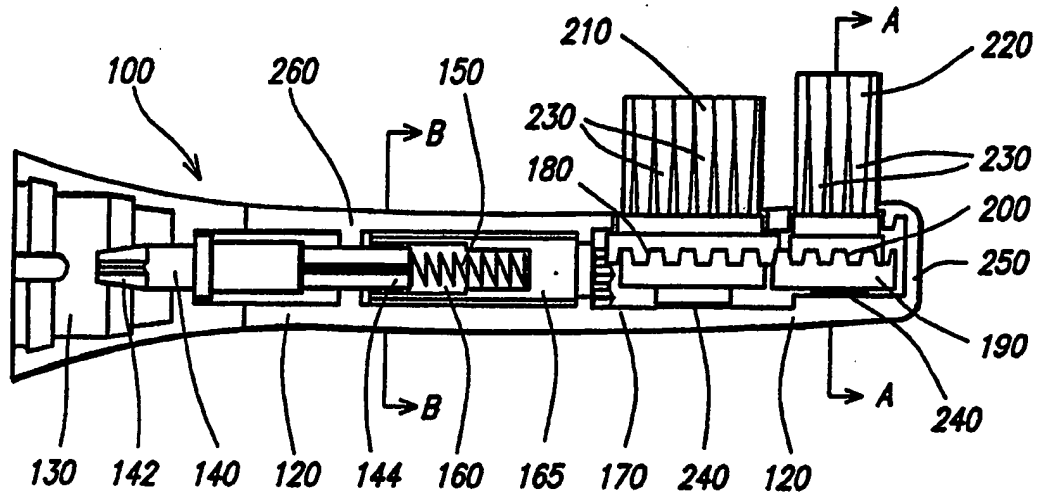


FIG. 1

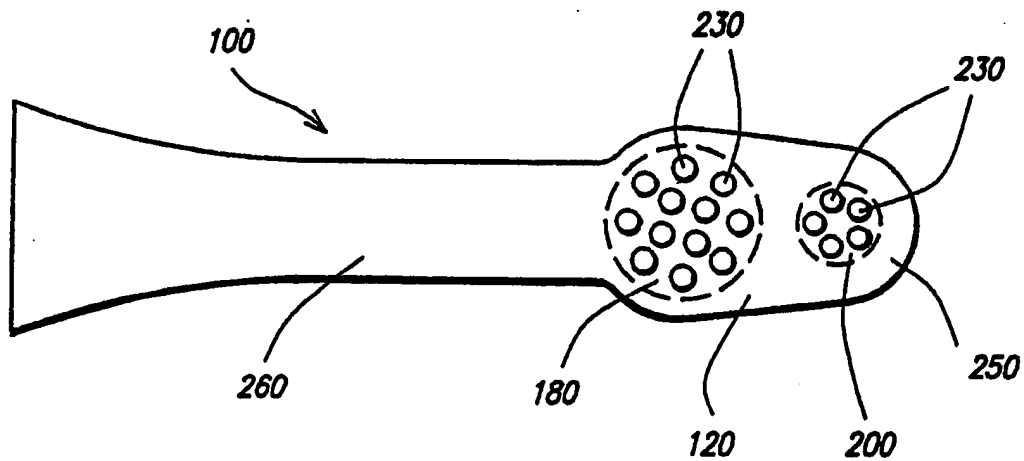
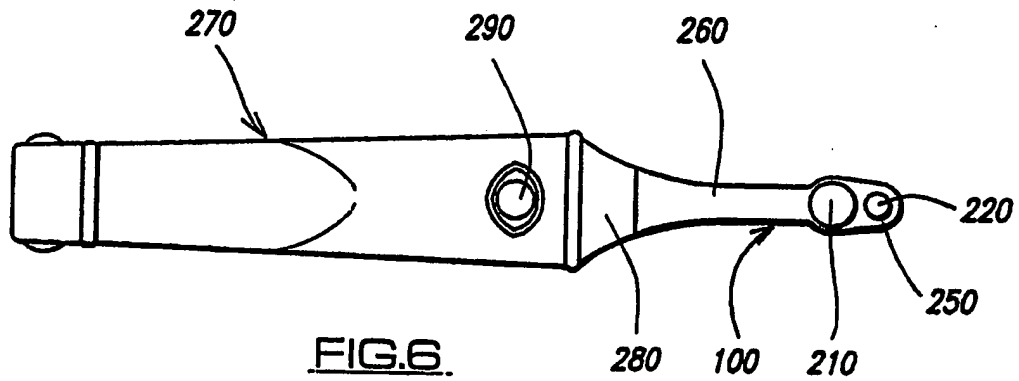
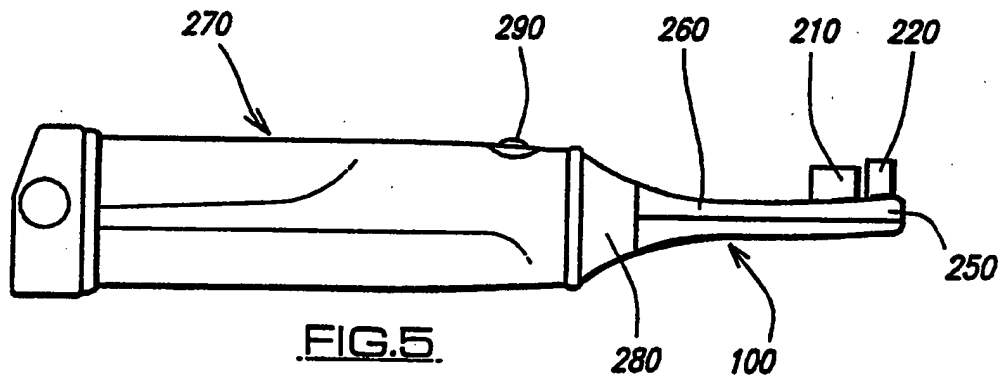
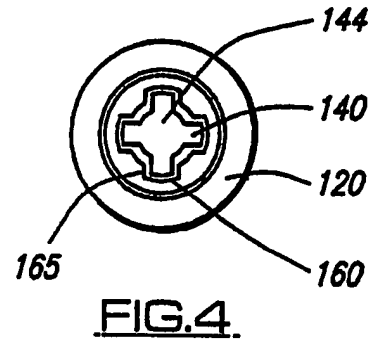
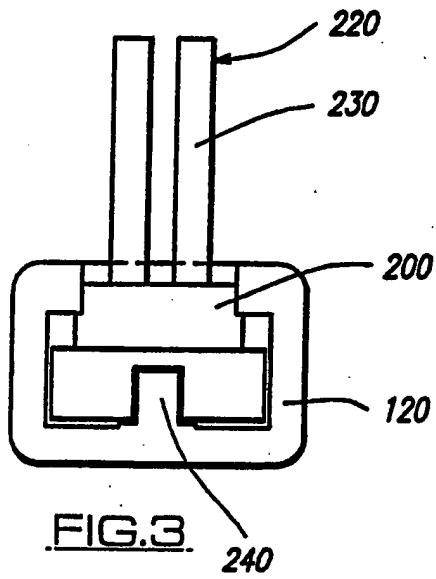


FIG. 2



IMPROVEMENTS IN OR RELATING TO AUTOMATED TOOTHBRUSHES

This invention relates to a toothbrush. More particularly,  
but not exclusively, this invention relates to an automated  
5 toothbrush having an improved teeth cleaning capability.

Known automated toothbrushes have the disadvantage that  
they are complicated in construction and do not effectively  
clean the teeth and gums.

10

An object of this invention is to overcome the above  
disadvantages or difficulties or at least to provide the  
public with a useful choice.

15 Accordingly, this invention consists in a toothbrush  
comprising a brush member; at least two toothbrush heads  
each having a plurality of bristle tufts; and gear means  
for connection to a drive means for driving the toothbrush  
heads in rotation.

20

Preferably two brush heads are provided which are  
continuously rotatable in directions opposite to each  
other, the brushes are generally cylindrical in shape and  
25 one has a smaller diameter than the other.

Preferred embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

5      Figure 1: is a side view of a brush member of a preferred embodiment of an automated toothbrush of the invention with the cover cutaway.

10      Figure 2: is an underneath view of a brush member of a preferred embodiment of an automated toothbrush of the invention showing the positions of bristle tufts in ghost lines.

15      Figure 3: is a cross-section through line A-A of figure 1.

Figure 4: is a cross-section through line B-B of figure 1.

20      Figure 5: is a side view of a preferred embodiment of an automated toothbrush of the invention.

Figure 6: is an top view of a preferred embodiment of an automated toothbrush of the invention.

25      Referring to figures 1 and 2, a preferred embodiment of the toothbrush of the invention is indicated generally at 100. The toothbrush includes a brush member having a casing 120

which is preferably formed in two halves for ease of assembly. Within the casing is formed a socket 130 for receiving a drive means enclosed with the toothbrush body shown in figures 4 and 5. Received by the drive means is  
5 a drive shaft 140 with a first end 142 which cooperates with the drive means so that the drive means may transmit torque to the drive shaft. To facilitate efficient torque transmission, the end 142 of the drive shaft 140 is of cruciform shape and is received by a similar shaped recess  
10 in the drive means.

The drive shaft transmits torque to a drive gear 170 having a gear shaft 165. The gear shaft 165 comprises a drive shaft receiving recess 160, which receives a second end 144  
15 of the drive shaft (see figure 4). Again to facilitate efficient torque transmission, the second end 165 of the drive shaft 140 is also of cruciform shape, and the recess 160 is of a similar, cooperating shape.

20 In order to avoid damage to the drive shaft 140 during insertion into a recess in the drive means, a spring 150 is provided. The spring 150 allows the drive shaft 140 limited axial movement and this prevents the drive shaft from snapping, if incorrectly inserted in the drive means.

25

The drive gear 170 has a plurality of annularly spaced

teeth, preferably bevelled, which mesh with similarly shaped and spaced teeth on a first crown gear 180.

5 The teeth on the first crown gear 180 in turn mesh with similarly shaped and spaced teeth on a second crown gear 190. The two crown gears 180, 190 are rotatably mounted on guide pins 240 in the casing 120. Thus, torque produced by a drive means may be transmitted via drive shaft 140, gear shaft 165 and drive gear 170 to crown gears 180 and 190,  
10 thus rotating the gears 180, 190

Crown gears 180, 190 each form part of a base to which a plurality of bristle tufts 230 are secured to form a brush head 210, 220. The bristle tufts extend through suitable  
15 apertures in the casing 120 (see figure 3).

Rotation of the gears 180, 190 therefore causes brush heads 210, 220 to rotate. The arrangement of gears depicted in figure 1 results in contra-rotation of the two brush heads.  
20 This contra-rotation provides for efficient brushing of the teeth and gums.

The bristles tufts 230 are preferably arranged in such a way that the brush heads 210, 220 have a circular base and,  
25 preferably, are cylindrical in shape.



In order to facilitate cleaning of the teeth and gums, especially those at the back of the mouth, the toothbrush 100 is tapered at one end 250. The brush head 220 positioned at the tapered end 250 of the toothbrush 100 is smaller in diameter than brush head 210, again to facilitate cleaning, especially towards the back of the mouth. The bristle tufts 230 of brush head 220 are preferably longer than those of head 210. The toothbrush 100 also preferably also comprises a slim neck 260 to, among other things, reduce the bulk of material entering the mouth; and for aesthetic purposes.

Referring now to figures 5 and 6, in use the toothbrush 100 is connected to a handle 270 by any conventional means, and the drive means in the handle is received by socket 130. The handle suitably has a tapered portion 280 and on/off switch or switches 290. The handle may contain batteries to power the drive means, or the drive means in the handle may be connected by way of a lead extending through the handle, to a mains power supply; or both.

All the components in the toothbrush are suitably made of plastics or similar materials, apart from the spring which is preferably formed of metal.

25

The above describes a preferred embodiment of the

invention, variations and modifications in which may be made without departing from the scope of the invention as defined in the accompanying claims.

5 For example: The gears may be arranged so that the brush heads rotate in the same direction.

There may be a plurality of brush heads. Three brush heads could be arranged in a triangular pattern, one smaller  
10 brush head being situated in the tapered end of the toothbrush.

The casing may be of any suitable shape.

15 The brush heads may be conical or any other suitable shape.

The handle may be of any suitable configuration and may include indentations in the shape of a hand. There may be a plurality of switches provided, one of which may provide  
20 for reversing the direction of rotation of the brush heads.

The gear means described is a simple and effective way of transferring torque from a drive means to the brush heads. However, other conventional means may be employed as will  
25 be clear to one skilled in the art to which the invention relates. The ends of the drive shaft need not be of

-7-

cruciform shape but may be of any shape which, when received by a similar shaped recesses, can transfer torque.

---

CLAIMS

1. A toothbrush comprising a brush member; at least two  
toothbrush heads each having a plurality of bristle  
tufts; and gear means for connection to a drive means  
for driving the toothbrush heads in rotation.  
5
2. A toothbrush as claimed in claim 1, wherein the  
toothbrush heads can be continuously rotated by the  
drive means.  
10
3. A toothbrush as claimed in claim 1 or claim 2, wherein  
the at least two tooth brush heads can contra-rotate.
4. A toothbrush as claimed in any one of claims 1-3,  
wherein the brush member is tapered at one end.  
15
5. A toothbrush as claimed in claim 4 wherein the  
toothbrush head or heads at the tapered end of the  
brush member are of reduced base width relative to the  
other head or heads.  
20
6. A toothbrush as claimed in any one of claims 1-5,  
wherein the toothbrush heads have a circular base.
7. A toothbrush as claimed in any one of claims 1-4,  
25

wherein the toothbrush heads are of cylindrical shape.

- 5 8. A toothbrush as claimed in any one of claims 1-7, wherein the gear means comprises a driving gear which meshes with a first gear corresponding to a first toothbrush head, which gear in turn meshes with a second gear corresponding to a second toothbrush head.
- 10 9. A toothbrush as claimed in claim 5 wherein the reduced base width toothbrush head or heads have longer bristles relative to the bristles of the other head or heads.
- 15 10. An automated toothbrush comprising a toothbrush as claimed in any one of claims 1-9, and a handle containing a drive means connected to the drive means.
- 20 11. A toothbrush substantially as herein described with reference to any one of the accompanying drawings.
12. An automated toothbrush substantially as herein described with reference to any one of the accompanying drawings.

10

**Patents Act 1977**  
**Examiner's report to the Comptroller under Section 17**  
**The Search report)**

Application number  
GB 9409398.6

**Relevant Technical Fields**

(i) UK Cl (Ed.M) A4K (KBC)

(ii) Int Cl (Ed.5) A46B (7/06, 7/08, 7/10) A61C (17/22, 17/24, 17/26)

**Databases (see below)**

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii)

Search Examiner  
DR C L DAVIES

Date of completion of Search  
21 JULY 1994

Documents considered relevant following a search in respect of Claims :-  
1-12

**Categories of documents**

- |  |   |
|--|---|
| <p><b>X:</b> Document indicating lack of novelty or of inventive step.</p> <p><b>Y:</b> Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p><b>A:</b> Document indicating technological background and/or state of the art.</p> | <p><b>P:</b> Document published on or after the declared priority date but before the filing date of the present application.</p> <p><b>E:</b> Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p><b>&amp;:</b> Member of the same patent family; corresponding document.</p> |
|--|---|

Category	Identity of document and relevant passages	Relevant to claim(s)
X	EP 0537465 A2 (ZIVI) see Figures 1, 2 6	1-3, 6, 7, 10
X	EP 0046521 A1 (LAZZARI) see Figure 4	1-3, 6, 7, 10
X	WO 90/09123 (KABUSHIKI) see Figures 1, 11, 14, 15	1-4, 6-8, 10
X	US 5170525 (CAFARO) see Figures 3, 5	1-4, 6-8
X	US 5138734 (CHUNG) see Figures 1A and 2	1-6, 7, 8, 10
X	US 5070567 (HOLLAND) see figures	1-3, 6-8, 10

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).